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CONTROL DATA DISTRIBUTED COMMUNICATION NETWORK (CDCNET)

INTRANET 3A

EXTERNAL REFERENCE SPECIFICATION

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RECORD OF REVISION

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1.0 INTRODUCTION

1.0 INTRODUCTION

The Intranet layer (3A) software provides an interface between individual network solutions software (layers 1 and 2) and higher layer CDCNET software. Layers above Intranet and various management entities communicate with (or know about) individual network solutions software through Intranet. The Intranet layer is also known as Generic 3A, generic in the sense that a single interface is defined for users of 3A regardless of the underlying network solution. That is, a user of Generic 3A is not concerned with the specifics of whether the underlying layer two is Ethernet, MCI, or HDLC. The 3A user simply interfaces to Generic 3A, not to the HDLC, Ethernet, or MCI 3A's. In particular, Intranet software or Generic 3A software refers to the layer 3A software associated with the Ethernet, Mainframe Channel and HDLC line network solutions.

1.1 PURPOSE

The Intranet layer (3A) provides the interface between higher layer CDCNET software and the layer two software (stream service routines) for the various network solutions.

1.2 REFERENCES

1. CDC Network Architecture GDS (ARH4243)
2. Xerox Internet Entity ERS (ARH 6221)
3. Routing M-E ERS (ARH 6264)
4. Initialization M-E ERS (ARH 5377)
5. HDLC SSR ERS
6. Ethernet Serial Channel (ESCI) ERS

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1.0 INTRODUCTION
1.2 REFERENCES

7. MCI ERS (ARH 5370)
9. COMMAND M-E ERS (ARH 5451)

2.0 FEATURE/SERVICE OVERVIEW

2.0 FEATURE/SERVICE OVERVIEW

2.1 FEATURES/SERVICES

The services offered by the Intranet 3A are

- 1) Sap management services
 - opening and closing of 3A saps
- 2) Data transfer services
 - data transfer to and from network solutions
- 3) Status indication services.
 - 3A status update indication

The features provided by Intranet 3A include timing out old entries in outgoing queues and addition /removal of 3A as well as lower layer headers in certain cases.

The users of Intranet services call a different subroutine based on the specific service desired. However the same subroutine is called to obtain the same service on different network solutions. For example, if layer 3B software wants to send a datagram on Ethernet or the HDLC network, it calls the same subroutine in Intranet.

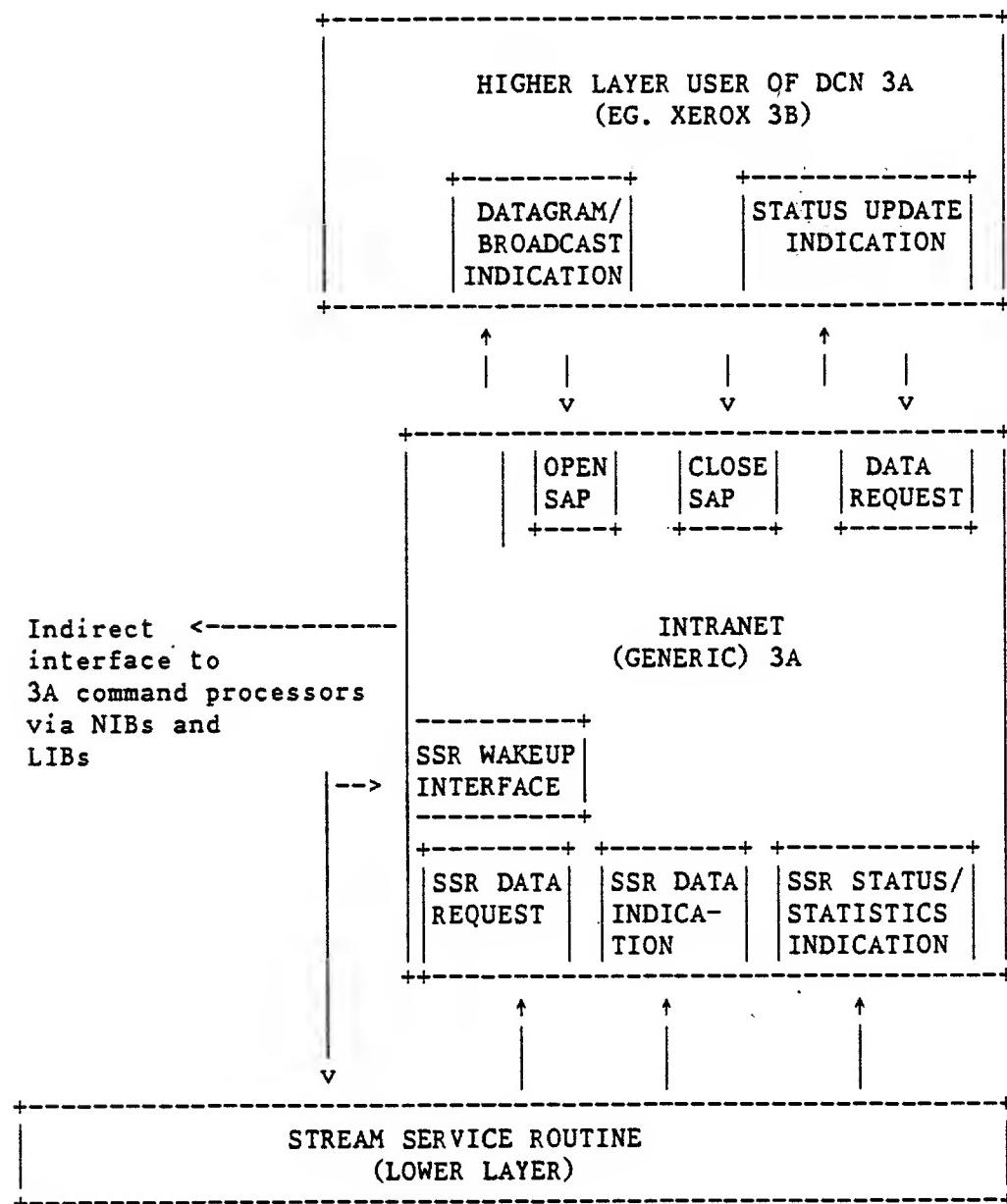
Each user of Intranet services identifies itself by opening a 3A SAP and providing a protocol type. This protocol type is used to route incoming messages to a specific user of Intranet. In addition to the protocol type, the user also provides addresses of procedures to be called to receive the following indications.

- . Data/Broadcast indication
- . Status update indication

Intranet services are provided via procedure calls. Different procedures exist for each service. Addresses of these procedures are globally known and are linked in at link/load time.

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2.0 FEATURE/SERVICE OVERVIEW
2.2 FUNCTIONAL RELATIONSHIPS

2.2 FUNCTIONAL RELATIONSHIPS**2.2.1 DESCRIPTION**

2.0 FEATURE/SERVICE OVERVIEW
2.2.2 DATA STRUCTURES

2.2.2 DATA STRUCTURES

NETWORK INFORMATION BLOCK

The Network Information Block (NIB) is a table that exists for each configured network solution. This table contains network related information needed to provide the various services and functions associated with that network solution and is the key interface data structure between Generic 3A and its higher layer users.

A NIB is created when a command to define a network is executed by the 3A command processors, and contains information concerning the network. The define command parameters can be used to provide the values of different fields in the NIB. Default values are used for the fields whose values are not provided via the command parameters.

For a particular DI all the NIBs will be linked together in a data structure called the Network Solution List (NSL). This data structure facilitates the search for a particular NIB. Each NIB is also linked to its associated Link Information Block (LIB) which will be explained in the next section.

When a command to cancel a particular network is executed, the corresponding NIB and the pointer to this NIB from any associated LIB are deleted.

2.0 FEATURE/SERVICE OVERVIEW

2.2.2 DATA STRUCTURES

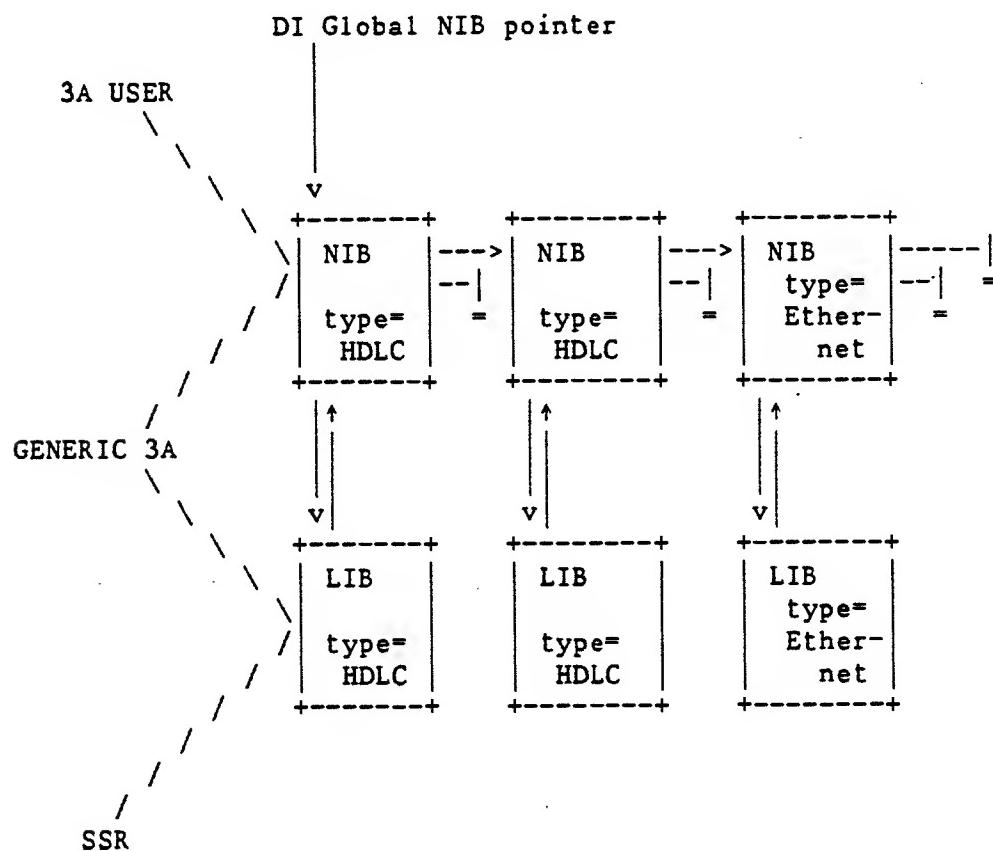
LINK INFORMATION BLOCK

The Link Information Block(LIB) is a table that exists for each configured layer two link. This table contains link related information needed to provide the services and functions associated with a particular link. It is also the key interface data structure used by the SSR in communicating with Generic 3A.

A LIB is created when a command to define a trunk is executed, and it contains information concerning the physical layer, link related information and 3A related information. As in the case for NIBs, the LIBs for a particular DI are also linked together through the Network Solution List. The address of the first entry in this list is stored in the System Data Table.

A LIB is deleted when a command to cancel the corresponding trunk is executed.

2.0 FEATURE/SERVICE OVERVIEW
2.2.2 DATA STRUCTURES

NIB/LIB DATA STRUCTURE EXAMPLE:**TWO HDLC LINKS, ONE ETHERNET LINK**

2.0 FEATURE/SERVICE OVERVIEW
2.3 UTILISED EXTERNAL INTERFACES

2.3 UTILISED EXTERNAL INTERFACES

The direct external interface is the SSR interface, and it describes the Intranet interfaces with the layer two Stream Service Routines (i.e. Ethernet, HDLC, and the Main Frame Channel Interface SSRs).

2.3.1 SSR DATA REQUEST

This service allows the Intranet to transmit the next data unit on a specific network solution. This service is initiated when the SSR calls the Intranet procedure, `ssr_data_request` to obtain the next data unit to be transmitted. If a data unit is not available for transmission, Intranet sets the `ssr_sleeping` field in the SSR's Link Information Block(LIB) to true. The SSR is then notified when a data unit is available (see SSR WAKEUP INTERFACE).

This routine is known to the SSR through field `ssr_data_req_proc` of the SSR's Link Information Block. The SSR requests a 3A data unit with a CALL/RETURN.

STREAM SERVICE ROUTINE DATA REQUEST

INPUT PARAMETERS :

`network_lib_ptr` - pointer to Link Information block (LIB)

OUTPUT PARAMETERS :

`data_ptr` - pointer to message
{NIL if there is no message in the 3A queue for SSR}

PROCEDURE `ssr_data_request` (
 `network_lib_ptr`: `^13_lib_type`;
 VAR `data_ptr`: `buf_ptr`);

2.0 FEATURE/SERVICE OVERVIEW
2.3.2 SSR DATA INDICATION

2.3.2 SSR DATA INDICATION

This service allows the SSR to notify Generic 3A of the next data unit received on the network solution. This service is provided via a procedure call from the SSR to the Intranet procedure, `ssr_data_indication`. (The address of this procedure is provided via the Generic 3A portion of the Link Information Block). If protocol type used in the header passed by SSR is invalid then this event is logged and the message is released in order to prevent buffer congestion.

INTRANET SSR DATA INDICATION

INPUT PARAMETERS :

`network_lib_ptr` - pointer to Link Information Block(LIB)
`data_ptr` - pointer to message

OUTPUT PARAMETERS :

NONE

PROCEDURE `ssr_data_indication` (
 `network_lib_ptr: ^13_lib_type;`
 VAR `data_ptr: buf_ptr`);

2.0 FEATURE/SERVICE OVERVIEW
2.3.3 SSR STATUS INDICATION

2.3.3 SSR STATUS INDICATION

The SSR provides Generic 3A with any status changes via a procedure call to this routine. This routine is known to the SSR through field `ssr_status_req_proc` of the SSR's Link Information Block. The SSR provides 3A status changes with a CALL/RETURN. If the link status passed be SSR is unknown then this event is logged.

INTRANET SSR STATUS INDICATION**INPUT PARAMETERS :**

`network_lib_ptr` - pointer to Link Information Block
`link_status` - status of link

OUTPUT PARAMETERS :

NONE

```
PROCEDURE ssr_status_indication (
    network_lib_ptr: ^13_lib_type;
    link_status: link_status_type);
```

2.0 FEATURE/SERVICE OVERVIEW

2.3.4 SSR WAKEUP

2.3.4 SSR WAKEUP

This interface is activated whenever the Generic 3A Data Request Routine determines that the SSR task is in an inactive state, waiting for the next data unit. This is determined by the `ssr_sleeping` field of the SSR's Link Information Block (LIB). The field `ssr_sleeping` is a boolean defined to be true if the SSR is sleeping(inactive) or is false if the SSR is active. An SSR WAKEUP Intertask message is sent to the SSR specifying a work code(wc) of `ssr_wakeup`.

3.0 DESCRIPTION OF SERVICES/FEATURES

3.0 DESCRIPTION OF SERVICES/FEATURES

3.1 OPEN 3A SAP

3.1.1 DESCRIPTION

This service allows the Intranet user to identify itself and to associate itself with a specific protocol type. This service is obtained by calling the Intranet procedure, `open_3A_sap`.

The procedure is called to open a SAP for all available network solutions. It is also used to provide addresses of user procedures to be called to provide various indications.

The return code parameter conveys the success or failure of the open SAP request as well as the reason for failure. A single SAP is opened for each user of Intranet.

3.1.2 PROGRAM INTERFACE

The user opens a 3A SAP with a CALL/RETURN.

INTRANET OPEN SAP

INPUT PARAMETERS :

`protocol_type` - protocol type to be associated with sap.
`data_ind_proc` - procedure pointer for Data/Broadcast indication.
`status_ind_proc` - procedure ptr for status update indication.

OUTPUT PARAMETERS :

`sap_id` - sap id number associated with user of specified protocol type (used on subsequent data request and close sap calls).
`call_status` - success or failure, reason for failure.

PROCEDURE `open_3A_sap` (`protocol_type: protocol_type_range;`
`dataind_proc: 13b_datagram_prc_type;`

3.0 DESCRIPTION OF SERVICES/FEATURES**3.1.2 PROGRAM INTERFACE**

```
statusupdind_proc: 13b_status_prc_type;
VAR sap_id_nbr: sap_id_type;
VAR call_status: 13A_status_type);
```

3.1.3 ERROR RECOVERY

Different users of Intranet are not allowed to associate themselves with the same protocol type. Therefore, a request by a user to open a SAP with a protocol type for which a SAP is already opened by another user is rejected and logged via a log message. An appropriate status is also returned to the corresponding user.

3.0 DESCRIPTION OF SERVICES/FEATURES
3.2 CLOSE 3A SAP

3.2 CLOSE 3A SAP

3.2.1 DESCRIPTION

This service allows the Intranet user to close a currently open Intranet SAP. It is obtained via a procedure call to the Intranet procedure, close_3A_sap.

3.2.2 PROGRAM INTERFACE

The user closes a 3A sap with a CALL/RETURN.

INTRANET CLOSE SAP

INPUT PARAMETERS :

 sap_id_nbr - sap id number assigned by previous
 call to the open_3A_sap procedure

OUTPUT PARAMETERS :

 call_status - success or failure (reason for
 failure)

PROCEDURE close_3A_sap (sap_id_nbr: sap_id_type;
 VAR call_status: 13A_call_status_type);

3.2.3 ERROR RECOVERY

If the sap to be closed is already closed or if it does not exist then this event is logged and a status is returned to the user.

3.0 DESCRIPTION OF SERVICES/FEATURES
3.3 GENERIC 3A DATA REQUEST

3.3 GENERIC 3A DATA REQUEST

3.3.1 DESCRIPTION

This service allows the Intranet user to send a datagram on a specific network solution. After adding an Intranet 3A header according to network solution type, the datagram message is queued via the common subroutine, message enqueue. If the ssr is waiting for a message (See LIB field `ssr_sleeping`) a wake-up message is sent via the `send_normal` common subroutine.

3.3.2 PROGRAM INTERFACE

The user request data with a CALL/RETURN.

INTRANET DATA REQUEST

INPUT PARAMETERS :

`network_id` - Network ID of the network solution
`destination_system_id` - System ID of the destination system
`sap_id_nbr` - sap id number (assigned by `open_sap_3A` procedure)
`data_ptr` - pointer to the data unit to be sent

OUTPUT PARAMETERS :

`call_status` - call status of request

```
PROCEDURE data_request_3A (network_id: net_id_type;
                           destination_system_id: sys_id_type;
                           sap_id: sap_id_type;
                           VAR data_ptr: buf_ptr;
                           VAR call_status: 13A_call_status_type);
```

3.3.3 ERROR RECOVERY

If the `network_id` is unknown or the `sap` does not exist or the corresponding network is not up then this event is logged and the data is returned back to the user. The user is also notified with a status.

3.0 DESCRIPTION OF SERVICES/FEATURES
3.4 GENERIC 3A DATA INDICATION

3.4 GENERIC 3A DATA INDICATION

3.4.1 DESCRIPTION

This service allows the Intranet user to receive the incoming datagram data unit which has the same protocol type as the one associated with the user. The service is obtained via a two step process.

- 1). The Intranet user provides the address of a procedure that is called to provide Data/Broadcast indication. This occurs once during the open_3A_sap procedure.
- 2). Intranet, on receipt of a datagram data unit with matching protocol type, calls this procedure.

It is assumed that the user runs on a non_premptive task in order to prevent deadlocks and other errors.

3.4.2 PROGRAM INTERFACE

A description of the "pointer to procedure" parameter specified by the Intranet user on the open 3A SAP call for receipt of Data/Broadcast indication follows. Also see section 8.0, NEW DATA TYPES, for a description of this data type, l3b_datagram_prc_type.

INTRANET DATA INDICATION

PARAMETERS :

multicast - specifies if this is a broadcast or a datagram network (broadcast/true, datagram/false).
receiving_network_id - Network ID of the network solution receiving the data unit.
originating_system_id - system id of system sending data unit.
data_ptr - pointer to message data unit.

PROCEDURE data_indication_3A (
 multicast: boolean;
 receiving_network_id: net_id_type;
 originating_system_id: system_id_type;
 data_ptr: buf_ptr);

3.0 DESCRIPTION OF SERVICES/FEATURES
3.5 GENERIC 3A STATUS UPDATE INDICATION

3.5 GENERIC 3A STATUS UPDATE INDICATION

3.5.1 DESCRIPTION

This service allows the Intranet user to obtain the status of requested network solutions following the opening of a 3A SAP. It subsequently allows the Intranet user to obtain any unsolicited status changes to those requested networks. The service is obtained via a two step process.

- 1). The Intranet user provides the address of a procedure that is called to provide Status Update indication. This occurs once during the open_3A_sap procedure.
- 2). Intranet, on receipt of a status update from the SSR calls this procedure.

3.5.2 PROGRAM INTERFACE

A description of the "pointer to procedure" parameter specified by the Intranet user on the open 3A SAP call for receipt of Status Update indication follows. Also see section 8.0, NEW DATA TYPES, for a description of this data type, 13b_status_proc_type.

INTRANET STATUS UPDATE INDICATION

PARAMETERS :

network_nib_pointer - pointer to Network Information Block (NIB).

The following fields within the Network Information Block (NIB) are of particular interest to the Generic 3A user on receipt of a Status Update indication.

network id - Network ID of the network solution supplying status update.

3.0 DESCRIPTION OF SERVICES/FEATURES

3.5.2 PROGRAM INTERFACE

network status - updated status
information. Allowable values are:

- net_up
- net_inactive
- net_congested

max pdu size (field max_data_unit_size) - maximum allowed
length of a data unit over this network solution.

system id (field system_id) - System ID of receiving system.

broadcast network indicator (field multicast) - boolean which
indicates whether this is a broadcast network
(broadcast/true, datagram/false).

pointer to multicast/title record

```
PROCEDURE status_indication_3A (
    network_nib_pointer: ^nib_type);
```

3.0 DESCRIPTION OF SERVICES/FEATURES
3.5.2 PROGRAM INTERFACE

3.6 ADDITION AND REMOVAL OF 3A HEADERS

Generic 3A provides for the addition and removal of 3A headers. The contents of the header is determined by network solution type. The allowable Intranet header types are HDLC, MCI and Ethernet.

See the NEW DATA TYPES section of this ERS for a description of these data types.

The Generic 3A header is added by the Generic 3A Data Request routine. The appropriate header is selected according to the network_type field specified in the Network Information Block (NIB).

The Generic 3A header is removed when the SSR calls the ssr_data_indication routine prior to calling the Generic 3A user's data/broadcast indication procedure specified on the open_3A_sap call.

3.0 DESCRIPTION OF SERVICES/FEATURES
3.7 DISCARDING DATA

3.7 DISCARDING DATA

All datagrams received from 3A users are queued in the LIB associated with the particular network solution. This queue is examined periodically and all datagrams queued which are older than six seconds are released. In addition the buffers utilized are also released. A log message will be issued for each network solution in which one or more datagrams are discarded.

4.0 PERFORMANCE

4.0 PERFORMANCE

The following performance parameters are established.

Opening a 3A SAP < 100 instructions

Closing a 3A SAP < 100 instructions

The following parameters are based on a DI system with two network solutions and reflect the worst case in terms of table lookups and loops (i.e. instruction counts are based on loop conditions being met after two executions).

The number of instructions to move data units from a SSR to a user of Intranet 3A - 300 instructions.

The number of instructions to move data units from a user of Intranet 3A to a SSR - 300 instructions.

The memory requirement for the Intranet module will be less than 5k.

5.0 FINITE STATE MACHINE

5.0 FINITE STATE MACHINE

Generic 3A has no external protocol and therefore does not need a FSM.

6.0 LOG MESSAGES

6.0 LOG MESSAGES

All software errors will be logged. These errors will be described below.

L O G M E S S A G E P U R P O S E

Logs the sap number of the unknown sap

D E S C R I P T I V E M E S S A G E

M A S K	L O G _ M E S S A G E _ B U F F E R		
fixed text	type	value	description
See mask1 below	NONE		Explained in mask1
The unknown sap number is	bin_int	1	The sap table number of the unknown sap

mask1 = 'User tried to close an unknown sap or
send data on an unknown sap'

L O G M E S S A G E I D

CONST

intranet_unknown_sap = min_log_message_id +97;

6.0 LOG MESSAGES

LOG MESSAGE PURPOSE

Logs the unknown protocol type

DESCRIPTIVE MESSAGE

M A S K	L O G _ M E S S A G E _ B U F F E R		
fixed text	type	value	description
See mask1 below	NONE		Explained in mask1
The unknown protocol type is	bin_int	1	The protocol number of the unknown protocol

mask1 = 'SSR passed unknown protocol in data indication'

LOG MESSAGE ID

CONST

intranet_unknown_protocol_type= min_log_message_id +98;

6.0 LOG MESSAGES

LOG MESSAGE PURPOSE

Logs the unknown network id

DESCRIPTIVE MESSAGE

M A S K	L O G _ M E S S A G E _ B U F F E R		
	type	value	description
fixed text See mask1 below	NONE		Explained in mask1
The unknown network id is	bin_int	1	The network id of this unknown network

mask1 = 'Unknown network_id is passed by user in
data request call'

LOG MESSAGE ID

CONST

```
intranet_unknown_network_id = min_log_message_id +99;
```

6.0 LOG MESSAGES

LOG MESSAGE PURPOSE

Logs the sap number of the already open sap

DESCRIPTIVE MESSAGE

M A S K	L O G _ M E S S A G E _ B U F F E R		
	type	value	description
fixed text			
See mask1 below	NONE		Explained in mask1
The sap number of this open sap	bin_int	1	The sap table number of the sap already open
The protocol ty- pe is	bin_int	1	The protocol number of this particular protocol

mask1 = 'User tried to open a sap already open'

LOG MESSAGE ID

CONST

```
intranet_sap_already_open      = min_log_message_id +100;
```

6.0 LOG MESSAGES

LOG MESSAGE PURPOSE

Logs the sap number of the inactive sap

DESCRIPTIVE MESSAGE

M A S K	LOG_MESSAGE_BUFFER		
fixed text	type	value	description
See mask1 below	NONE		Explained in mask1
The sap number of this inactive sap is	bin_int	1	the sap table number of this sap which is not active

mask1 = 'User tried to close an inactive sap or
send data on an inactive sap'

LOG MESSAGE ID

CONST

```
intranet_sap_not_active      = min_log_message_id +101;
```

6.0 LOG MESSAGES

LOG MESSAGE PURPOSE

Logs information on datagrams released

DESCRIPTIVE MESSAGE

M A S K	L O G _ M E S S A G E _ B U F F E R		
	type	value	description
fixed text	NONE		Explained in mask1
See mask1 below			
Number of datagrams released	bin_int	1	The number of datagrams released in all networks
The network id is	bin_int	1	The network id of this particular network

mask1 = 'Datagrams older than 6 seconds are released'

L O G M E S S A G E I D

CONST

intranet_datagram_released = min_log_message_id+102;

6.0 LOG MESSAGES

LOG MESSAGE PURPOSE

Logs the unknown link status

DESCRIPTIVE MESSAGE

M A S K	L O G _ M E S S A G E _ B U F F E R		
	type	value	description
fixed text			
See mask1 below	NONE		Explained in mask1
The unknown link status	bin_int	1	The link status type of this unknown link

mask1 = 'Unknown link status is received from SSR'

LOG MESSAGE ID

CONST

```
intranet_unknown_link_status = min_log_message_id+103;
```

7.0 STATISTICS

7.0 STATISTICS

The following Statistics will be collected for each network solution.

Network name

Number of messages transmitted

Number of messages received

Number of messages received as broadcast

* Count in network congested state

* Count in network uncongested state

* Count in any other state

Number of transitions into the congested state

Number of messages discarded from the queues

* These counts are used to calculate percentage of time spent in each state

The following queue statistics will be collected

Sum of outgoing messages added to the queues for all network solutions during the reporting period.

Sum of outgoing messages in queues for all network solutions at the start of the reporting period.

Number of all incoming messages received from the SSRs during the reporting period.

8.0 INSTALLATION OPTIONS

8.0 INSTALLATION OPTIONS

None.

6

9.0 NEW DATA TYPES

9.0 NEW DATA TYPES

Data types defined in above sections of this ERS are:

- | | |
|----------------------------|--------------------------------|
| 1) nib | Network Information Block(NIB) |
| 2) lib | Link Information Block(LIB) |
| 3) network_range_type | Network types |
| 4) protocol_range_type | Protocol type codes |
| 5) user_datagram_proc_type | NIB 3B Datagram Procedure |
| 6) user_status_proc_type | NIB 3B Status Procedure |
| 7) network_id_type | Network ID type |
| 8) sap_id_type | Service Access Point type |
| 9) 13A_status_type | Intranet status codes |
| 10) hdr_3A_hdlc | Intranet header(HDLC) |
| 11) hdr_3A_mci | Intranet header(MCI) |
| 12) hdr_3A_esci | Intranet header(ESCI) |

9.0 NEW DATA TYPES

NIB - Network Information Block.

TYPE

```
NIB_TYPE = RECORD
    next_nib:           ^nib_type,          { chain to next nib
    nib_with_common_lib: ^nib_type,          { chain to next nib which
                                            { uses same lib
    network_type:       network_range_type, { network solution type
    network_status:     network_status_type, { network solution status
    network_id:         network_id_type,   { network solution id
    network_name:       clt$name,          { network solution name
    network_cost:       0 .. 65535,         { network solution cost
    x25_pdn_id:        x25_valid_pdns, { specific x25 pdn type
    x25_init:           boolean,            { x25 network initialized
    x25_net:            boolean,            { network type X25
    relay_allowed:      boolean,            { network allows relay
    multicast_network:  boolean,            { multicast nw indication
    cdna_routing_info_nw: boolean,          { routing info indication
    rotary:             boolean,            { hdlc rotary indication
    cdna_xerox_broadcast_addr: system_id_type, { broadcast addr for nw.
    max_data_unit_size: 0 .. 65535,         { maximum data unit size
    intranet_header_size: 0 .. 65535,         { 3A header size
    local_dte :          integer,            { local network routing addr
    remote_dte:          integer,            { remote network routing addr
    congestion_threshold: 0..255,            { system becomes congested
    un_congestion_threshold: 0..255,          { system becomes uncongested
    lib_ptr:              ^13_lib_type,       { chain to associated LIB
RECEND;
```

9.0 NEW DATA TYPES

LIB - Link Information Block.

TYPE

```
L3_LIB_TYPE = RECORD
    nib_ptr:           ^nib_type,          { pointer to owner nib
    output_qcb:        qcb@,             { queue control block
    nxt_lib_ptr:       ^l3_lib_type,      { chain to next lib
    link_status:       link_status_type, { status of this link
    ssr_task_id:       taskid,           { ssr task id
    ssr_tracing,      ,                  { diagnostic trace
    minimum_set_lib_address: ^l3_lib_type {set by 3A command processor
    lib_defined,       ,                  {set by 3A command processor
    trunk_to_replace_minimum_set,       {set by 3A command processor
    ssr_collecting_stats,             { collecting statistics
    ssr_sleeping:      boolean,           { ssr needs wakeup call
    ssr_data_req_proc:   ssr_data_req_proc_type, { get data
    ssr_data_ind_proc:   ssr_data_ind_proc_type, { send data
    ssr_status_ind_proc: ssr_status_ind_proc_type, { send status
    link_type:          owner_type,         { owner of LIB
    trunk_name:         clt$name,          { name of LIB
    next_linked_lib:    ^l3_lib_type,      {addr of next LIB in DI
    lib_defined:        boolean,           {lib configured or booted
RECEND;
```

9.0 NEW DATA TYPES

Network Range Type.

```
TYPE
    network_range_type = (hdlc_network,escl_network,mci_network,
                           telenet_network,tymnet_network,datapac_network);

TYPE
    protocol_range_type = (diagnostic_3a_protocol_type ..
                           routing_me_3a_protocol_type),

    user_datagram_proc_type = ^procedure (
        multicast: boolean; { broadcast/true, datagram/false
        receiving_network_id: network_id_type;
        originating_system_id: system_id_type;
        VAR data_ptr: buf_ptr),

    user_status_proc_type = ^procedure (
        network_nib: ^nib_type);

    network_id_type = integer,
    sap_id_type = 0 .. Offff(16),
    13A_status_type = (request_processed, sap_out_of_range,
                        sap_active, sap_not_active,
                        network_down, unknown_network);
```

9.0 NEW DATA TYPES

GENERIC 3A HEADER TYPES

```
TYPE
  13a_header_type = 'record
    case integer of
      - 1 -
        {HDLC INTRANET HEADER
          hdlc_3a: packed record
            dsap: protocol_range_type,
            ssap: protocol_range_type,
            control: 0 .. Off(16),
            recend,
        }

      - 2 -
        {MCI INTRANET HEADER
          mci_3a: packed record
            destination_address: system_id_type,
            source_address: system_id_type,
            length: 0 .. Offff(16),
            dsap: protocol_range_type,
            ssap: protocol_range_type,
            control: 0 .. Off(16),
            recend,
        }

      - 3 -
        {ESCI INTRANET HEADER
          esci_3a: packed record
            destination_address: destination_address_type,
            source_address: system_id_type,
            length: 0 .. Offff(16),
            dsap: protocol_range_type,
            ssap: protocol_range_type,
            control: 0 .. Off(16),
            recend,
            casend,
          recend;
        }
    
```

9.0 NEW DATA TYPES

NETWORK STATUS TYPE

TYPE

```
network_status_type = (net_up,
                        net_inactive,
                        net_congested,
                        net_up_for_remote_load,
                        net_terminate);
```

CONST

```
routing_me_3a_protocol_type = 12,
initialization_me_3a_protocol_type = 8,
diagnostic_3a_protocol_type = 2,
xerox_internet_protocol_type = 4;
```

APPENDIX A

FUTURE ENHANCEMENTS TO THE INTRANET ERS

The following changes will be made to the Intranet ERS after R1.

- The LIB will be defined as a variant record. A variant will be defined for each type of trunk as well as for each intended use of the same trunk. Some examples of these variants are CDCNET ethernet LIB, DOD ethernet LIB, CDCNET HDLC LIB, Tymnet HDLC LIB, C170 MCI LIB, C180 MCI LIB, etc.
- The NIB will be defined as a variant record. A variant will be defined for each type of network solution which may be supported.
- The Cybil definition of the network solution status will be re-worked to replace "net_up_for_remote_load" with "network_enabled" status.
- Information will be added about the use of an X.25 virtual circuit as a network solution.
- Information will be added about the support of the HDLC rotary trunks.
- Information will be added about the support provided for non-standard 3A headers as well as communication with non-CDNA systems.